Notes.

MR. ALAN A. CAMPBELL SWINTON has been elected chairman of the council of the Royal Society of Arts for the ensuing year.

DR. EDRIDGE-GREEN, C.B.E., has been appointed a special examiner in colour vision and eyesight by the Board of Trade.

THE Civil List Pensions granted during the year ended March 31 are shown in a White Paper just issued, and include the following:—Mrs. Howell, in recognition of her late husband's eminent public service in the Geological Survey of Great Britain, 50*l.*; Miss Juliet Hepworth, in recognition of her late brother's services to meteorology and oceanography, 50*l.*; Mrs. K. Macdonald Goring, in recognition of her husband's services to biometrical science, 85*l.*; and Mrs. Leonard William King, in recognition of her husband's services to Assyrian and Babylonian study, 85*l.*

AT a public meeting held at the Mansion House in October, 1912, the following proposals for commemorating the work of Lord Lister were adopted:—The placing of a memorial in Westminster Abbey, to take the form of a tablet with medallion and inscription; the erection of a monument in a public place in London; and the establishment of an International Lister Memorial Fund for the advancement of surgery, from which either grants in aid of researches bearing on surgery or awards in recognition of distinguished contributions to surgical science should be made, irrespective of nationality. A meeting of the general committee was held in the rooms of the Royal Society on Monday, July 19, to receive and adopt the report of the executive committee appointed in 1912. The chairman, Sir Archibald Geikie, stated that the sums received in respect of subscriptions from the British Empire and foreign countries amounted to 11,846*l.* 5*s.* 10*d.* A memorial tablet, executed by Sir Thomas Brock, was unveiled in Westminster Abbey on November 1, 1915, and steps are being taken for the erection of a monument in a public place in London. In order to carry out the scheme for the establishment of the International Lister Memorial Fund for the Advancement of Surgery, it was resolved that:—(*a*) Out of the general fund a sum of 500*l.*, together with a bronze medal, be awarded every three years, irrespective of nationality, in recognition of distinguished contributions to surgical science, the recipient being required to give an address in London under the auspices of the Royal College of Surgeons of England. (*b*) The award be made by a committee constituted of members nominated by the Royal Society, Royal College of Surgeons of England, Royal College of Surgeons in Ireland, University of Edinburgh, and University of Glasgow. (*c*) Any surplus income of the general fund, after providing for the erection of a monument and defraying administrative expenses, be either devoted to the furtherance of surgical science by means of grants or invested to increase the capital of the fund. The Royal College of Surgeons of England has consented to become the trustees and administrators of the Lister Fund and to carry out its objects, subject to the above provisions of the scheme. The subscription list is still open, and the hon. treasurer of the fund is Sir Watson Cheyne, Bart., to whom donations may be addressed at the Royal Society, Burlington House, London, W.1.

A MARBLE statue to the memory of Wilbur Wright was unveiled on July 17 at Le Mans, where twelve years ago this aviator accomplished a flight of nearly a mile. We learn from the *Times* that the statue is the work of the sculptor Landowski, and typifies the struggle of man to conquer the air. The nude figure of a man is represented as having scaled a rugged mountain peak and as stretching out his arms to the hitherto unconquered element, air. The base of the monument is carved with bas-relief figures of Wilbur and Orville Wright and Léon Bollée, the Frenchman who collaborated in the early experiments.

THE thirty-ninth annual meeting of the Society of Chemical Industry was held at Newcastle-upon-Tyne on July 13–16. The gold medal of the society was presented to M. Paul Kestner, president of the Society of Chemical Industry of France, by Prof. Henry Louis, who read the presidential address of Mr. John Gray. Sir William J. Pope was elected president for the ensuing year. An invitation to hold the next annual general meeting at Montreal was accepted.

A CONGRESS of Philosophy, in which members of the Société Française de Philosophie are taking part, and to which the American Philosophical Association is sending delegates, is to take place at Oxford on September 24–27. Two of the subjects of discussion are likely to be of especial scientific interest: one a symposium on the principle of relativity, to be opened by Prof. Eddington, and the other a discussion to be opened by Dr. Head on disorders of symbolic thinking due to local lesions of the brain. The opening meeting of the congress will be presided over by Lord Haldane, and the inaugural address will be by Prof. Bergson. Arrangements are under the direction of Mr. A. H. Smith, New College, Oxford.

THE Faraday Society and the Physical Society of London are arranging to have a joint symposium and general discussion in October next upon the physics and chemistry of colloids and their bearing on industrial questions. The subject will be introduced by a brief survey of the present position of colloidal physics and chemistry, and there will then be discussion on the following subdivisions of the subject:—Emulsions and emulsification, physical properties of elastic gels, cataphoresis and electro-endosmose, precipitation in disperse systems, glass and pyrosols, and non-aqueous systems. In spite of the importance of colloidal physics and chemistry in many branches of manufacture, and of the interest which the subject has aroused in recent years, much light remains to be thrown on the nature of the manufacturing process in which colloids play a part. It is hoped that the discussion will focus attention on some of these problems, that its result will be to indicate lines of advance and suggest further researches, and that it will be fruitful not only in helping to a fuller understanding of the laws of the colloidal state, but also in suggesting new applications for colloids in the laboratory and in the works. The exact date and place of meeting and further particulars will be announced later. In the meantime, anyone desirous of using the opportunity of the discussion to bring forward experimental matter or theoretical considerations bearing on the above-mentioned branches of the subject is asked to communicate as soon as possible with the secretary of the joint committee, Mr. F. S. Spiers, 10 Essex Street, London, W.C.2.

A SPECIAL meeting of the Röntgen Society was held on July 15 in the chemical theatre of University College, London, by kind permission of the authorities. The occasion was an address by Dr. W. D. Coolidge, director of the research laboratories of the General Electric Co., of Schenectady. An audience of more than 250 people gathered to hear from the inventor of the X-ray tube which bears his name a detailed account of the processes involved in the manufacture of the Coolidge tube—or rather we should say the Coolidge tubes, for a number of different types of tube, each suitable for different working conditions, are the outcome of the investigations carried out under Dr. Coolidge's direction over a number of years. Dr. Coolidge in his address laid considerable emphasis upon the amount of investigation entailed in the use of tungsten either as a hot filament or as the target of an X-ray tube. The welding of this highly brittle metal and its perfect annealing with copper are technical triumphs, and the details of these processes in their final stages were of very great interest. While the effort is at present being made by the General Electric Co. to standardise radiographic procedure by combining a high-tension outfit which automatically limits the quantity and quality of the X-rays from the tube, it is recognised that no such procedure is possible in radio-therapy at the present day. The limitations imposed upon the production of very short wave-length X-rays are largely technical ones, and we look with confidence to their production in the near future, for both in medical work and in the examination of metals and other materials they are likely to prove of great value. If the production of these more penetrating radiations involve new ideas in the construction of the X-ray tubes, those who heard Dr. Coolidge's address will feel that such considerations will not be allowed to delay what is becoming a seriously felt want.

IN a paper read before the Royal Statistical Society in April (Journal, 1920, vol. lxxxiii., part 3, pp. 1–44), Dr. T. H. C. Stevenson presented the results of an inquiry into the fertility of the various social classes in England and Wales from the middle of the nineteenth century to 1911. Child mortality varies directly and very markedly with the number of children born and the rapidity with which they are born. It also varies with the age of the mother at birth. If allowance is made for the differences of marrying age in different classes, fertility is found to increase downwards throughout the social scale. The difference in fertility between the classes is, broadly speaking, a new phenomenon, for it is small for marriages before 1861, and rapidly increases to a maximum for those of 1891–96. That the decline in the birth-rate is due to the artificial restraint of fertility is indicated by the following features: The gradual spread of the decline throughout society, from above downwards; the exceptionally low fertility of occupied mothers; and the increase in the defect for the higher social classes with increase of duration of marriage up to twenty-five years. The lowest fertility rates are returned for the most purely middle-class occupations —the professions. The comparatively low child mortality of the less fertile classes goes but a small way numerically to compensate for their low fertility. The classes which are least fertile when married are likewise those that marry latest in life. Ante-nuptial conception leads to great under-statement of the number of marriages of less than twelve months' duration. Such under-statement is the rule amongst all classes where the wife's marriage age is under twenty, and becomes less frequent as the wife's age increases. At ages above twenty its frequency varies with the social position, reaching its maximum amongst unskilled labourers.

PROF. E. W. MACBRIDE contributes to the latest number of *Scientia* (vol. xxviii., No. 99, 1920) a trenchant article on "The Method of Evolution." By the "force of heredity," he says, is meant the tendency of the offspring to resemble the parent. It is obvious that in some way this force must be modified as time progresses, otherwise evolution could not take place, and the manner and means of this modification are just what we mean by the phrase "method of evolution." The Darwinian view that large results may be reached by the selection of small individual variations is seriously weakened by "pure line" experiments. The mutationist view of the importance of "sport"-variations exhibiting Mendelian inheritance cannot be accepted as more than an accessory theory, for most mutations are of the nature of "cripples," and utterly unlike the differentiating characters which distinguish allied species. There remains a third alternative: the inheritance of the effects of use and disuse. This is *the* method of evolution, "the dominating influence which has moulded the animal world from simple beginnings into the great fabric of varied life which we see around us." If we ask for evidence of the transmission of somatic modifications, we are referred by Prof. MacBride to the researches of Kammerer. If we submit that opinion is divided as to the validity of these, we are told to repeat the experiments, which is, of course, a fair enough answer. In the meantime, we are invited to consider how bacteria, modified to perform feats in disruptive chemistry of which their ancestors were incapable, hand on their individually acquired new qualities to their abundant progeny. And if we suggest that this is not a test case, since bacteria have no soma and do not multiply by germ-cells, we are told that the distinction between somatoplasm and germplasm is a "Weismannian nightmare." All this points clearly to the need for fresh experiments.

Prof. Stephenson's paper "On a Collection of Oligochæta from the Lesser-known Parts of India and from Eastern Persia" (Memoirs Indian Museum, vol. vii.) is very informative. The known Oligochæta, about 150 before 1883, were about 1000 species in 1911. To these Prof. Stephenson adds 24 species and 5 varieties, modestly remarking: "It can scarcely be said, however, that the results of the present investigation include anything of the first order of importance; it is now too late to expect it." One of the new species, *Nais gwaliorensis*, is about one-tenth of an inch long and one-hundredth of an inch broad, yet in an earlier paper the author shows this brevity far outdone by Annandale's *Chaetogaster spongillae*. Among very much larger forms the systematist may note that Prof. Stephenson here makes his *Eutyphoeus Kempi* a synonym of *Eutyphoeus chittagongianus*, Michaelsen, and that author's *bengalensis* a synonym of his species *Waltoni* in the same genus. So lately as 1893 "absence of branchiæ" was included in the definition of the Oligochæta. Now, not only does *Branchiura Sowerbyi*, Beddard, have, as its generic name implies, gills on the tail end, but Prof. Stephenson also finds a species of Branchiodrilus, "a Naid worm with gills remarkably like those of Branchiura, but on the anterior part of the body."

The twenty-eighth Report, for the year 1919, on the Lancashire Sea-Fisheries Laboratory contains a note by Mr. A. Scott upon a midwinter invasion of the Barrow Channel by an immense swarm of the phosphorescent flagellate Noctiluca and the Ctenophores Pleurobrachia and Beroë. On December 16, 1919, Mr. Scott made one of his routine visits to the sandy mud-flats between tide-marks, and found that the area—500 yards wide and 1000 yards long—between Roa Island and Foulney appeared as if it had been thickly sprinkled with glass marbles. These were the Pleurobrachia, many of them of large size (22 mm. high), and mingled with them were stranded Beroë. At the water's edge was a brick-red, oily-looking zone 6 in. to 12 in. wide, and the water in the creeks was covered by a similar oily layer, which on examination proved to be composed of Noctiluca. Twenty-four hours later the area was again examined, but only one Pleurobrachia was found, and there was no Noctiluca in the plankton. It is quite unusual to find an abundance of Noctiluca and Ctenophores in this area in midwinter. Noctiluca has been abundant on former occasions along the coasts of North Wales and Lancashire, but hitherto only in the period between the beginning of August and the end of September.

The "Reports for the Year 1919 on the Science Museum and on the Geological Survey and the Museum of Practical Geology" (H.M. Stationery Office, 1920, price 3*d.*) are accompanied by a map showing the grouping of institutions devoted to education and research in the great quadrangle between Cromwell and Prince Consort Roads, South Kensington. The Science Museum has gone into temporary occupation of part of the eastern block of new buildings while this block is being completed, the galleries thus occupied being left in an unfinished state until a second move onward can be made. The arrangement is a testimony to the energetic and necessary expansion of the collections, which now include an aeronautical division. The report on the Museum of Practical Geology refers to the congestion of its collections, which have been largely increased by the groups of materials of economic importance brought together in recent years. There is no reference, however, to any scheme of extended buildings. The publication of maps and memoirs has been maintained at a high level, and it is interesting to note how the public demand shows an enormous and intelligent preference for the "drift" series of colour-printed maps as against those showing the "solid" geology only.

The Geological Survey of Scotland has issued the fourth of its series of memoirs dealing with the detailed economic geology of the central coalfield of Scotland, the present volume being devoted to Area VI., which forms a block near the centre of the field and includes the districts of Rutherglen, Hamilton, and Wishaw. This is naturally an area of very great economic importance, and comprises some of the most productive portions of the Scottish coalfield. A valuable feature of the publication is the series of sections obtained from borings and sinkings, which have been printed on separate sheets; it may perhaps be regretted that the scale selected is somewhat minute. It need scarcely be said that the geological relationships of the coal seams and of the various economic minerals met with in the field are described in full detail, and that the memoir, together with the revised maps which it is intended to accompany, will be of the greatest value to mining engineers whose professional work lies in that area of the Scottish coalfield.

A report on the weather experienced at Falmouth Observatory has recently been issued by the Observatory Committee of the Royal Cornwall Polytechnic Society. The observatory is closely associated with the Meteorological Office, and many of the records for Falmouth appear in the several reports of the Office, which probably is sufficient reason for the small amount of work done actually at the observatory. Funds available at the spot are clearly limited, and the staff is, consequently, small. Pressure, temperature, and rainfall results in the report are compared with the means of the forty-five years 1871 to 1915, whilst in the Meteorological Office publications the records are compared with the new normals for thirty-five years, 1881 to 1915. Probably in course of time general uniformity in this respect will be adopted. The mean air temperature for November was a record for cold, and its minimum, 26° F., was the coldest for the year. The total rainfall for the first six months of the year was 5·89 in. greater than for the last six months, which is a reversal of the ordinary rule. October was a record for dryness, rainfall measuring 1·62 in. Bright sunshine had an average record for the year of 4·8 hours per day. October had 158·9 hours, which is a record for that month; the extreme range of the totals for October is 77·6 hours, not 69·2 hours, as stated in the report, for which result 1919 was overlooked. The table of sea temperatures from observations made in the harbour and the comparison with air temperatures is of considerable interest, but the differences from the air of the maximum and minimum sea values scarcely seem satisfactory, since the observations are not strictly for the same periods, the sea temperatures being for fewer days.

THE Seventh Report of the Industrial Fatigue Research Board (Textile Series, No. 1), dealing with "Individual Differences in Output in the Cotton Industry," has just been issued. It is the result of researches made by Mr. S. Wyatt, Investigator to the Board. The scope of the report represents an attempt to collect information on the question of the relative importance of the human and mechanical factors in various branches of the cotton industry. It is intended to be suggestive rather than conclusive in its nature, to lead on to a careful collection of facts and thence to more detailed and intensive investigations. There is great variety in the conditions obtaining in various types of cotton mills, some, for example, in which, as in the spinning of cotton, the output is almost entirely controlled by the machine, whereby individual differences in ability are reduced to a minimum; while in others, such as in the process of drawing-in by hand, there appears to be much more scope for the expression of individual differences of ability, and therefore of output, by the persons concerned. Thus it may be found possible, where there exist large individual differences of output—which implies that the mechanical factor is subsidiary—so to modify the human conditions of employment that increased efficiency, prosperity, and comfort may result. The inquiry has of necessity been of considerable difficulty, having regard to the variability of the conditions prevailing in the course of preparation and manufacture, yet valuable, if inconclusive, results have been reached, which at least show that the various processes in the cotton industry can be classified and graded according to the magnitude of the individual differences which they produce, wherein lies the relative importance of the human and mechanical forces. Scarcely any attempt has been made in the mills to determine efficiency in the various processes, yet the collection of statistical data would cause the employer and the manager to take a scientific interest in their work, stimulate inquiry and investigation, and lead to improved methods. We may reasonably ask why the workers should not be invited to participate in the research, since it is in their interests also that the best results should be secured.

THE International Institute of Agriculture at Rome has issued the following information with regard to the estimated yields of cereals throughout the world. In the United States the area under winter wheat is considerably smaller than that of last year. Moreover, the season has been somewhat unfavourable, so that the coming crop is estimated at 13·2 million tons, which is 66 per cent. of last year's yield and 86 per cent. of the five previous years' average. It is, however, probable that there are considerable stocks of old wheat still to be exported, and these, together with the reduced new crop, should make the exports for the coming season equal to those for the year ending June, 1920. Drought has considerably affected the crops in Algeria and in southern Italy, and the outlook in Poland is unpromising, especially for rye. In the other countries of the northern hemisphere the condition of the winter cereal crops is normal, while the recent wheat crop in British India shows an increase of 30 per cent. over last year's yield. The maize crop in Argentina is estimated at 30,000,000 quarters, which is 32 per cent. higher than the five previous years' average. This increased yield will probably be an important factor among the cereal resources of the coming season.

THE Journal of the British Science Guild for June contains a special tribute to Lord Sydenham, the retiring president, contributed by Sir O'Moore Creagh. A series of six articles reviews the administrative activities of the Guild, of special interest being the account of the reception by Mr. A. J. Balfour of the deputation on State awards for scientific and medical discovery. The deputation had a sympathetic reception, the justice of the principle being generally conceded, but Mr. Balfour suggested as a difficulty the exact allocation of credit to the authors of scientific discoveries. This problem, it is pointed out by Sir Ronald Ross, has already been dealt with satisfactorily by the Royal Society, the Nobel Prize Committee, and other authorities. It is suggested that pensions and awards might be included in the Civil List. Lt.-Col. W. A. J. O'Meara writes with experience of the need for the utilisation of science in Government Departments. An element of consequence is the concentration of power in the hands of the higher division clerks and the permanent staff, which doubtless militates against the introduction of new ideas. Memoranda by the Health Committee on the milk question raise a number of important points in connection with the purity of supply and the possibility of the communication of diseases through milk. Sir Thomas H. J. C. Goodwin's Chadwick lectures on "Army Hygiene in the War and After" (see NATURE for June 24, p. 532) and Mr. J. J. Robinson's popular lecture on "Knowledge in National Reconstruction," delivered before 1100 members of the Portsmouth Brotherhood, are summarised. The issue is completed by a list of the officers, fellows, and members of the Guild.

THE Ministry of Transport has stated that it is seriously considering the organised electrification of the railways, and the importance of this subject at the present time can scarcely be over-estimated. Sir Philip Dawson's paper on "Electric Railway Contact Systems," which was read to the Institution of Electrical Engineers on June 30, is, therefore, of immediate interest. Before a standard system of electrification can be evolved the question of the relative merits of collecting the current from an overhead system or from a third rail must be discussed. From the data given in the paper a strong case can be made out for overhead collection. The flexible method of suspending the overhead collecting wire on the Brighton Railway has proved thoroughly satisfactory, and the "double insulation" used throughout has reduced breakdowns to a minimum. With third-rail systems it is necessary to pay higher wages to the workmen employed on the line owing to the increased danger. The data given bring out the interesting fact that the wear of the trolley wire is proportional to the current collected. When no current is taken the wear is almost negligibly small. A curious anomaly in the treatment of railways with and without Parliamentary powers was pointed out. The former railways are not allowed to have more than a 7-volt drop on their rails, whilst the latter have sometimes more than a 100-volt drop for short periods. It seems to us that a careful search should be made in neighbouring pipes, etc., for electrolytic damage in the latter case. If the damage should prove to be inappreciable, then the limit of 7 volts might be raised for all railways, as this would appreciably lower the cost of electrification.

Messrs. Newton and Wright, Ltd., desire it to be known that their business will be carried on in future from their works address, 471–77 Hornsey Road, N.19, which is now the head office of the company. In furtherance of their policy of restricting themselves to a wholesale business, an arrangement has been concluded with Messrs. Allen and Hanburys, Ltd., by which this firm becomes selling agents in the London area for Messrs. Newton and Wright, and also in those parts of the United Kingdom where the latter is not specially represented. Messrs. Allen and Hanburys are taking over the electro-medical showroom at 72 Wigmore Street, W.1, until recently occupied by Messrs. Newton and Wright, who will, however, have free access to these showrooms, and one of their directors will always be glad to meet country and other customers by appointment who may not have time to visit the head office at Hornsey Road. The arrangements with Messrs. Allen and Hanburys are so framed as not to preclude Messrs. Newton and Wright doing business with other trade houses, and the firm will be pleased to continue supplying their specialities through whatever trade house a customer may select.

The special catalogues of Messrs. J. Wheldon and Co., 38 Great Queen Street, W.C.2, are always of interest and value, and the latest (New Series, No. 90) is no exception. It is a well-edited, classified list of upwards of 1200 books and pamphlets on ornithology. The sections are British Islands, Europe, Asia, Africa, North America, Central and South America, Australasia, General Systems, etc., Economic Ornithology, Miscellanea, and Morphology. Many scarce works are included. In addition, particulars are given of many complete sets or long runs of scientific journals. The catalogue should be of service to purchasers of books of science.

Messrs. H. K. Lewis and Co., Ltd., 136 Gower Street, W.C.1, have just circulated the quarterly catalogue of new books and new editions added to their Medical and Scientific Circulating Library during the months April–June. It is a useful classified list of the works in science published in the period named, and should be found useful even to non-subscribers to the library. Messrs. Lewis have also issued a list of second-hand and surplus library books an agriculture, botany, chemistry, engineering, geology, physics, zoology, etc. Many of the volumes are offered for sale at greatly reduced prices.

Our Astronomical Column.

A New Comet.—The second cometary discovery of the year was made at Nice by M. Schaumasse on July 18 at 13h. 37·1m. G.M.T., in R.A. 1h. 47m. 52s., south decl. 1° 14′, daily motion +2m. 24s., S. 5′, 11th magnitude.

The following positions have been deduced on the assumption of uniform motion:

		R.A.			S. Decl.	
		h.	m.	s.	°	
July	23 ...	1	59	43	1	39
	28 ...	2	11	43	2	4

The comet is a morning star, rising at 1 a.m. summer time. It is not very far from Tempel's comet, discovered at Kyoto at the end of May, but of which no further observations have come to hand.

Later.—M. Schaumasse now finds that his new comet is identical with Tempel's second periodic comet, the previous announcement by Mr. Kudara, of Kyoto, being erroneous. The time of perihelion now becomes 1920 June 9·67, a month earlier than the time deduced from Mr. Kudara's announcement.

The following is an approximate ephemeris for Greenwich midnight:

		R.A.			S. Decl.		Log *r*	Log Δ
		h.	m.	s.	°			
July	15 ...	1	40	4	1	14	0·1402	9·9674
	23 ...	1	59	24	1	26	0·1488	9·9623
	31 ...	2	16	40	1	53	0·1585	9·9577
Aug.	8 ...	2	30	52	2	36	0·1693	9·9522
	16 ...	2	42	32	3	33	0·1805	9·9467
	24 ...	2	50	48	4	47	0·1920	9·9403

Publications of the Dominion Astrophysical Observatory, Victoria, B.C., Vol. i., No. i.—This volume contains a full account of the inception of the scheme of constructing the great 72-in. equatorial, and demonstrates the immense amount of careful thought and consultation of experts, both opticians and astronomers, that preceded the adoption of the designs.

Before the site was settled, Mr. W. E. Harper tested the quality of seeing at a number of stations in different parts of Canada, using a 4½-in. Cooke photovisual telescope. Victoria was finally selected, owing to the excellent seeing at night, though there was less sunshine than at Ottawa; the small diurnal range of temperature also favoured it.

The glass discs were cast at St. Gobain, the optical work was entrusted to the J. A. Brashear Co., and the mechanical work and dome to the Warner and Swasey Co.

The ball-bearings, in dustproof cases, prove very efficient, so that it is stated that when the clock is disconnected a 3½-lb. weight on a 26-ft. arm suffices to set the telescope in motion; a 400-lb. weight is found sufficient for the driving clock, which is wound automatically by an electric motor. The volume contains details of the zonal tests applied to the mirror, the results being very satisfactory. Temperature insulation, consisting of cotton-felt, is used round the mirror, and with the small temperature changes that take place at Victoria the definition will never be appreciably affected by this cause.

The comfort and convenience of the observers are studied, all the movements being carried out electrically. Details are also given of the powerful spectrograph, which is surrounded by a temperature-case. It is possible to use the instrument visually without removing the spectrograph, the image being displaced laterally by reflecting prisms.

Numerous large-scale photographs of the various parts make it easy to follow the descriptions.